

Name \_\_\_\_\_



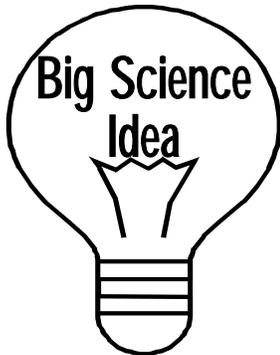
## Forces

When you ride a bike, your foot **pushes** against the pedal. The push makes the wheels of the bike move.

When you drop something, it is **pulled** to the ground by gravity.

A **PUSH** or a **PULL** is a **FORCE**. So, a good definition for *force* is *a push or pull in a particular direction*.

Forces affect how objects move. They may cause motion; they may also slow, stop, or change the direction of motion of an object that is already moving.



Forces can affect motion in several ways:

- They can make objects start moving
- They can make objects move faster
- They can make objects move slower
- They can make objects stop moving
- They can make objects change direction
- They can make objects change shape

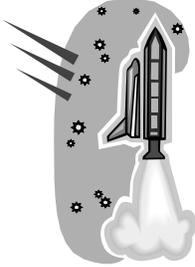
Since force cause changes in the **speed** or **direction** of an object, we can say that forces cause changes in **velocity**, so.... **Forces cause acceleration!**

### FORCE FACTS:

- Forces are measured in Newtons (N)
- Forces usually act in pairs
- Forces act in a particular direction
- Forces usually cannot be seen, but their effects can



Label the force in each picture as a push or pull. Then describe whether the force is causing a change in speed or direction or both.

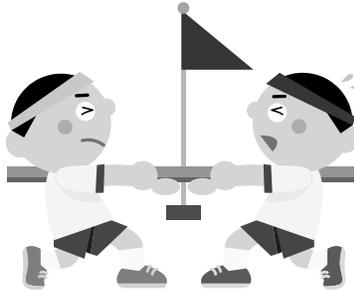
More than one force can act on an object at a time. The forces can push or pull in any direction. What happens to the object when the forces act depends on two things:

- How strong the forces are
- The direction of the forces

When more than one force acts on an object, the forces combine to form a **net force**. The combination of all the forces acting on an object is the net force.

Forces may work together or they may be opposite forces.

Two or more opposite forces are **balanced forces** if their effects cancel each other and they **do not cause a change in an object's motion**. If two forces of equal strength act on an object in opposite directions, the forces will cancel, resulting in a net force of zero and no movement.



If the effects of the forces don't cancel each other, if one force is stronger than others, the forces are **unbalanced forces**. **Unbalanced forces cause a change in motion**; speed and/or direction.

When two forces act in the **same direction** on an object, the net force is equal to the **sum** of the two forces.

When two unequal forces act in **opposite directions** on an object, the net force is the **difference** of the two forces

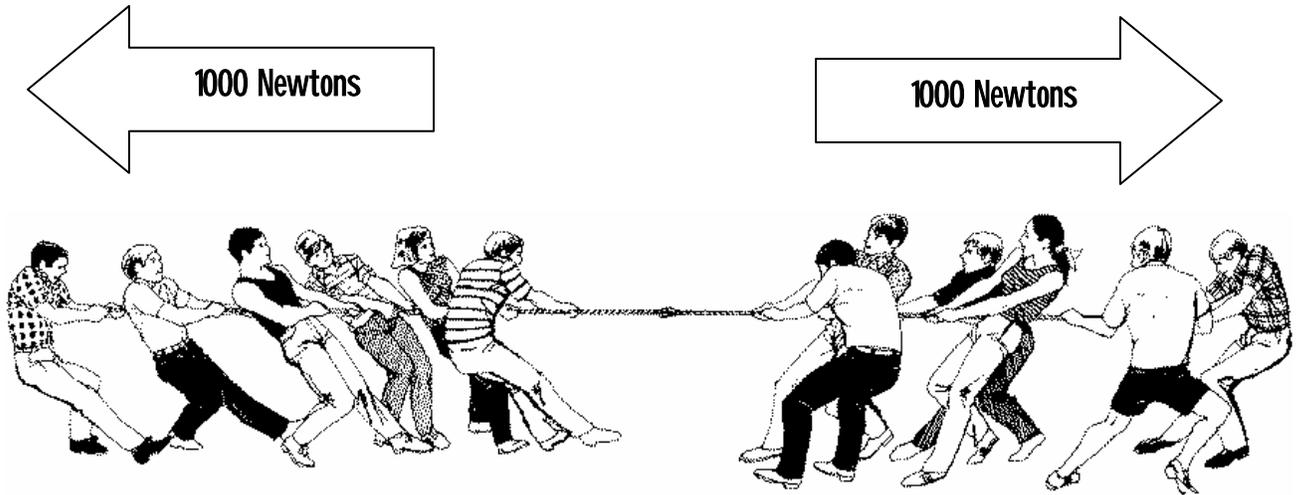
The final force and its direction are called a **resultant**.

## Summary Sheet

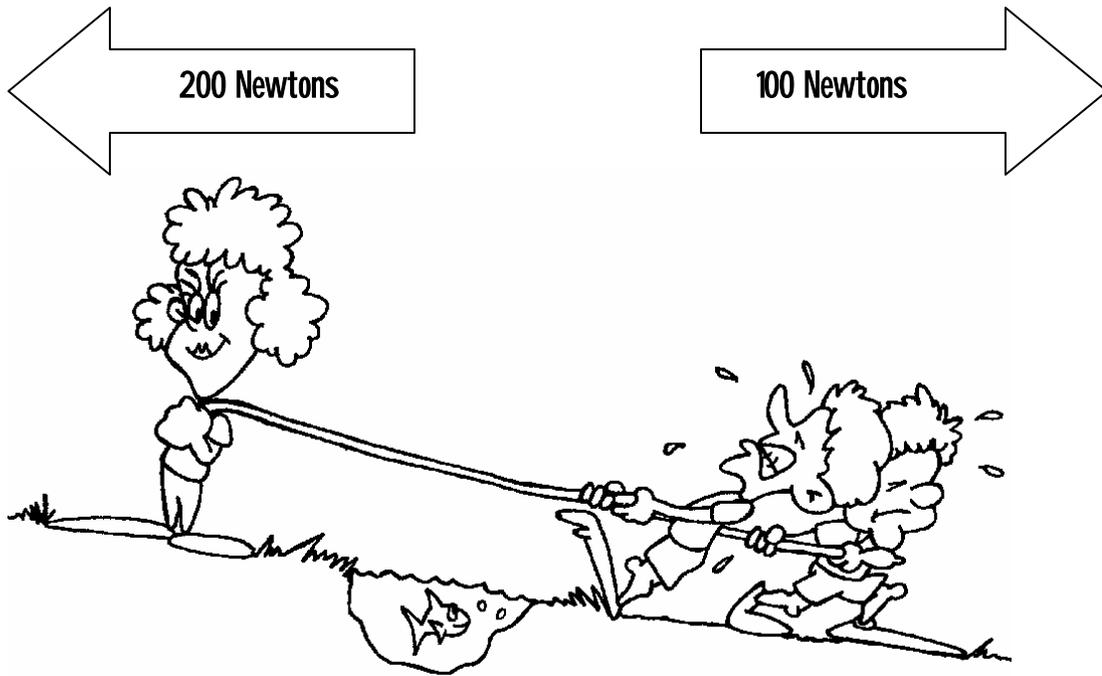
Read the previous page and **USE COMPLETE SENTENCES** to answer the following questions:

1. What are the two aspects of force that need to be known to determine how an object will move?
  - 
  -
2. Use your own words to define **Net Force**:
3. Describe what happens to an object's motion when it is experiencing **Balanced Forces**?
4. If the motion of an object **changes**, what must be true about the forces acting on that object?
5. Use your own words to define **Unbalanced Forces**:
6. Use your own words to define **Resultant**:
7. Draw a picture that explains **Unbalanced Forces** and **Resultant**:

Circle the best answer:



1. The forces shown above are **PUSHING / PULLING** forces.
2. The forces shown above are **WORKING TOGETHER / OPPOSITE FORCES**.
3. The forces are **EQUAL / NOT EQUAL**.
4. The forces **DO / DO NOT** balance each other.
5. The resultant force is **1000 N TO THE RIGHT / 1000 N TO THE LEFT / ZERO**.
6. There **Is / Is NO** motion.



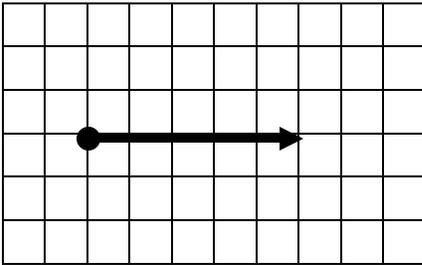
7. The forces shown above are **PUSHING / PULLING** forces.
8. The forces shown above are **WORKING TOGETHER / OPPOSITE FORCES**.
9. The forces are **EQUAL / NOT EQUAL**.
10. The forces **DO / DO NOT** balance each other.
11. The stronger force is pulling to the **RIGHT / LEFT**.
12. The weaker force is pulling to the **RIGHT / LEFT**.
13. Motion is to the **RIGHT / LEFT**.

**SHOWING FORCES:**

A force can be shown with a **vector**. A vector is a line with an arrow. It begins with a dot.

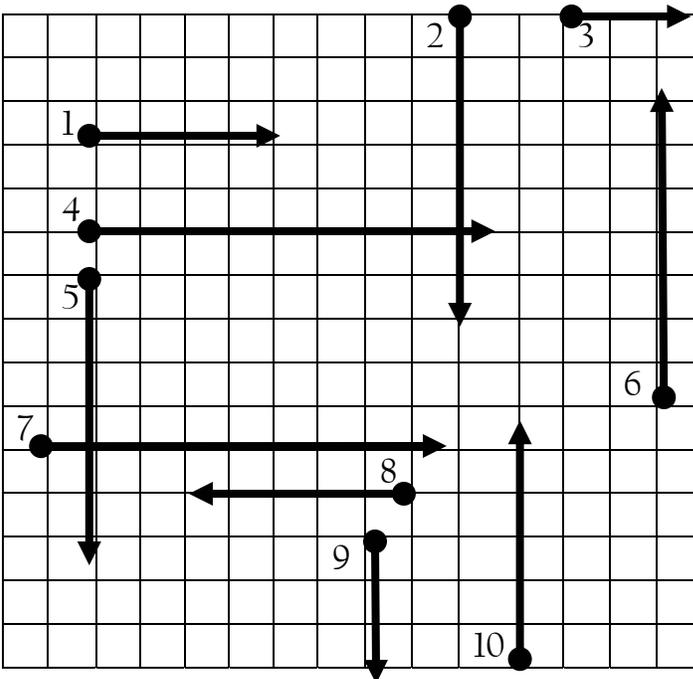
- The dot shows where the force begins
- The length of the arrow shows the amount of force
- The arrows shows the direction of the force

Example:



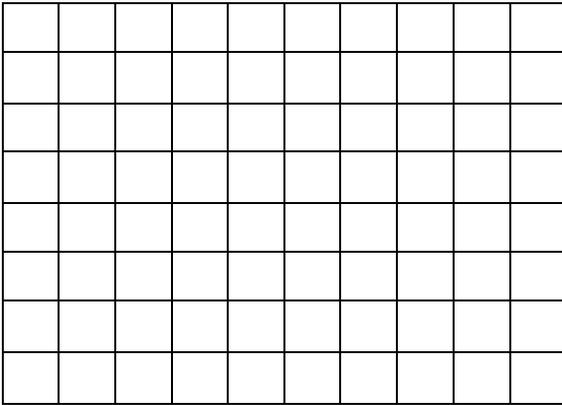
Each square represents force of ONE NEWTON.  
This vector shows a 5 n force to the right.

Fill in the chart on the right with the information found in the figure on the left. Each square represents 1 n of force.

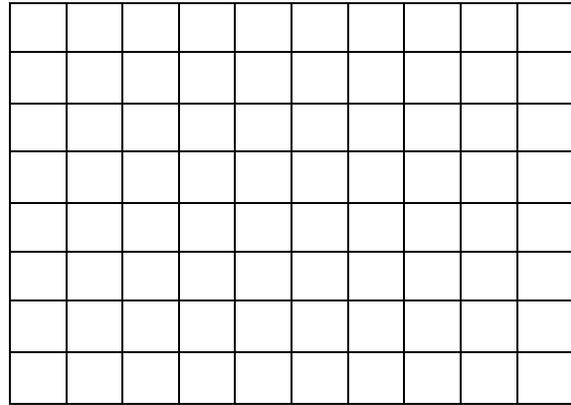


	Force (n)	Direction (right, left, up, down)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

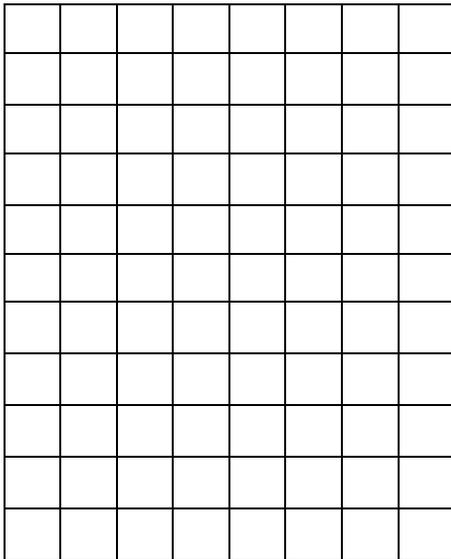
Draw each vector on the chart below. Start at the dot. Each square represents one n of force.



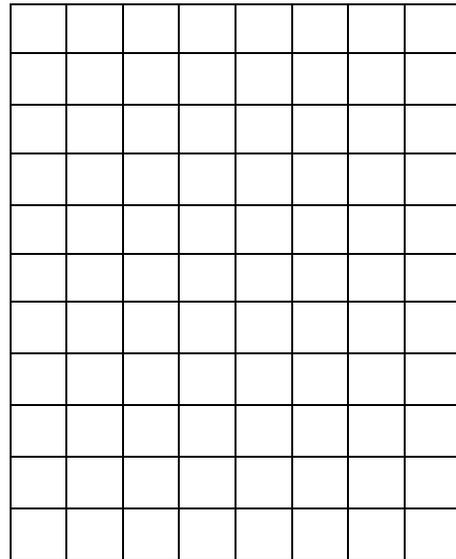
7 n force to the right



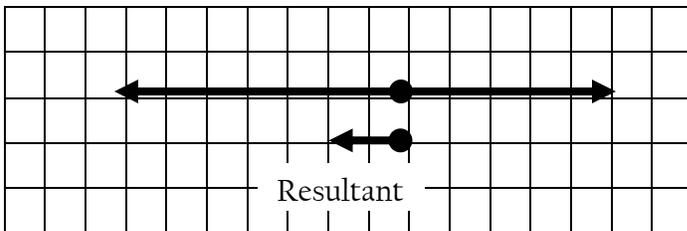
5 n force to the left



10 n upward force



3 n downward force



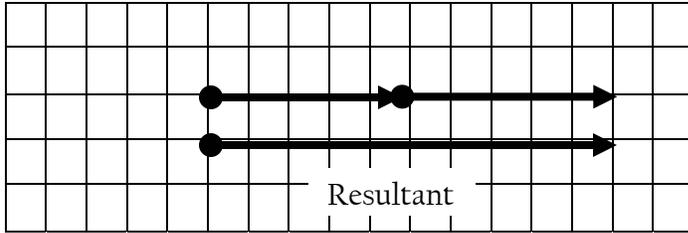
The figure to the left shows two opposite forces.

There is a 5 kg force to the right and a 7 n force to the left. Subtract 5 from 7.

The resultant is a 2 n force to the left.

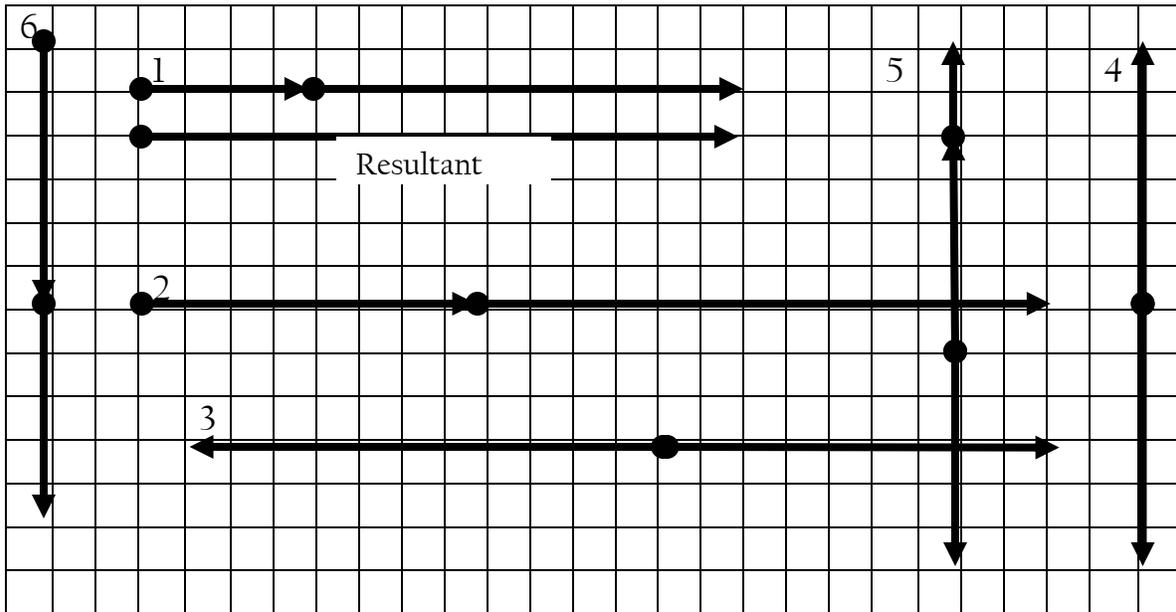
The resultant vector is shown

## Forces Worksheet 8



This figure shows two forces in the same direction.  
They are both 5 n forces.  
Add 5 and 5.  
The resultant is a 10 n force to the right.

Six sets of vectors are shown below. Draw the resultant vector next to each set. Start at the dot. One has been for you.



Use the above information to fill the chart:

	Total number of forces	Amount of force (n)	Direction (right, left, up, down)	Resultant	Movement? (yes, no)
1					
2					
3					
4					
5					
6					